

Appn. No.: 10/615,417
Amendment dated September 16, 2005
Non-Final Office Action dated Aug. 19, 2005

Amendments to the Claims:

1. *(Amended)* A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint; and
a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the vertebra without penetrating any bone portion of the vertebra; and
an attachment mechanism attaching the artificial facet joint bearing element to the fixation mechanism, wherein the attachment mechanism comprises a screw.

2. *(Originally presented)* The prosthesis of claim 1 wherein the fixation mechanism is further adapted and configured to attach to a lamina portion of the vertebra.

3. *(Originally presented)* The prosthesis of claim 2 wherein the fixation mechanism is further adapted and configured to attach to the lamina portion of the vertebra substantially at a spinous process location.

4. *(Originally presented)* The prosthesis of claim 3 wherein the fixation mechanism is further adapted and configured to be in contact with the lamina portion of the vertebra on at least two opposing sides of the lamina portion of the vertebra.

5-8. *(Cancelled)*

9. *(Originally presented)* The prosthesis of claim 1 wherein the fixation mechanism comprises first and second vertebra contact surfaces, the distance between the first and second vertebra contact surfaces being adjustable.

10. *(Originally presented)* The prosthesis of claim 1 wherein the fixation mechanism comprises first and second vertebral contact components comprising first and second vertebral contact surfaces, respectively, at least one of the first and second vertebral contact components being moveable with respect to the other vertebral contact component.

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11. *(Cancelled)*

12. *(Amended)* The prosthesis of claim 11-1 wherein the attachment mechanism is adapted and configured to traverse a midline of the vertebra.

13-14. *(Cancelled)*

15. *(Amended)* The prosthesis of claim 11-1 wherein the attachment mechanism disposes the artificial facet joint bearing element caudad from the fixation mechanism.

16. *(Amended)* The prosthesis of claim 11-1 wherein the attachment mechanism is adapted and configured such that the artificial facet joint bearing element is moveable in a cephalad or caudad direction with respect to the fixation mechanism.

17-21. *(Cancelled)*

22. *(Originally presented)* The prosthesis of claim 1 wherein the fixation mechanism comprises a clamp.

23. *(Originally Presented)* The prosthesis of claim 1 wherein the fixation mechanism is a first fixation mechanism, the prosthesis comprising a second fixation mechanism adapted and configured to penetrate a bone portion of the vertebra to attach the artificial bearing element to the vertebra.

24-33. *(Cancelled)*

34. *(Originally presented)* A prosthesis to replace right and left cephalad portions of right and left natural facet joints on a vertebra, the prosthesis comprising:

right and left artificial facet joint bearing elements adapted and configured to replace the cephalad portions of the right and left natural facet joints; and

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to a lamina portion of the vertebra without penetrating any bone portion of the vertebra.

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35. *(Originally presented)* The prosthesis of claim 34 further comprising an attachment mechanism attaching the right and left artificial facet joint bearing elements to the fixation mechanism.

36. *(Originally presented)* The prosthesis of claim 35 wherein the attachment mechanism is adapted and configured to move the right and left artificial joint bearing elements in a cephalad or caudad direction with respect to the fixation mechanism.

37. *(Originally presented)* The prosthesis of claim 35 wherein the attachment mechanism comprises a rod.

38. *(Originally presented)* The prosthesis of claim 35 wherein the attachment mechanism comprises right and left fasteners for the right and left artificial facet joint bearing elements, respectively.

39. *(Amended)* A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint; and

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the vertebra, the fixation mechanism comprising a non-invasive support member adapted and configured to attach to a lamina portion of the vertebra,
wherein the support member comprises first and second vertebra contact surfaces, the distance between the first and second vertebra surfaces being adjustable.

40. *(Originally presented)* The prosthesis of claim 39 wherein the support member is further adapted and configured to attach to the lamina portion of the vertebra substantially at a spinous process location.

41. *(Amended)* The prosthesis of claim 40 39 wherein the support member is further adapted and configured to be in contact with the lamina portion of the vertebra on at least two opposing sides of the lamina portion of the vertebra.

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42. *(Cancelled)*

43. *(Originally presented)* The prosthesis of claim 39 wherein the fixation mechanism is further adapted and configured to attach the artificial facet joint element to the vertebra without blocking access to a pedicle portion of the vertebra.

44. *(Cancelled)*

45. *(Amended)* The prosthesis of claim 39 wherein the support member comprises first and second vertebral contact components comprising first and second vertebral contact surfaces, respectively, at least one of the first and second vertebral contact components being moveable with respect to the other vertebral contact component.

46. *(Originally presented)* The prosthesis of claim 39 further comprising an attachment mechanism attaching the artificial facet joint bearing element to the fixation mechanism.

47. *(Originally presented)* The prosthesis of claim 46 wherein the attachment mechanism traverses a midline of the vertebra.

48. *(Cancelled)*

49. *(Originally presented)* The prosthesis of claim 46 wherein the attachment mechanism disposes the artificial facet joint bearing element caudad from the fixation mechanism.

50. *(Amended)* The prosthesis of claim 46 wherein the attachment mechanism is adapted and configured such that the artificial facet joint bearing element is moveable in a cephalad or caudad direction with respect to the fixation mechanism.

51. *(Amended)* The prosthesis of claim 50 wherein the attachment element comprises a location element moveable in a cephalad or caudad direction with respect to the fixation mechanism.

52. *(Originally presented)* The prosthesis of claim 51 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint.

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53. *(Originally presented)* The prosthesis of claim 52 wherein the right and left artificial facet joint bearing elements are attached to the attachment element.

54. *(Originally presented)* The prosthesis of claim 39 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint.

55. *(Originally presented)* The prosthesis of claim 54 further comprising right and left attachment elements attaching the right and left artificial facet joint bearing elements to the fixation mechanism.

56. *(Originally presented)* The prosthesis of claim 39 wherein the fixation mechanism comprises a clamp.

57. *(Amended)* A method for implanting a cephalad facet joint prosthesis on a vertebra, the method comprising the steps of:

removing the spinous process;

affixing a fixation mechanism to the vertebra without penetrating any bone portion of the vertebra; and

disposing an artificial facet joint bearing element extending from the fixation mechanism in a predetermined position with respect to the vertebra,

wherein the affixing step comprises affixing the fixation mechanism to a lamina portion of the vertebra.

58. *(Amended)* The method of claim 57 wherein the affixing step comprises affixing the fixation mechanism to a lamina portion of the vertebra substantially at or near the removed spinous process.

59-62. *(Cancelled)*

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63. *(Amended)* The method of claim 6157 wherein the fixation mechanism comprises first and second vertebral contact components, the affixing step comprising moving one of the first and second vertebral contact components with respect to the other.

64. *(Originally presented)* The method of claim 63 wherein the affixing step further comprises preventing relative movement between the first and second vertebral contact components after the moving step.

65. *(Originally presented)* The method of claim 57 wherein the affixing step comprises affixing a fixation mechanism to the vertebra without blocking access to a pedicle portion of the vertebra.

66. *(Originally presented)* The method of claim 57 further comprising fastening the artificial facet joint bearing element to the fixation mechanism.

67. *(Originally presented)* The method of claim 66 wherein the fastening step comprises inserting a fastener through the fixation element.

68-69. *(Cancelled)*

70. *(Originally presented)* The method of claim 57 wherein the fixation mechanism is a first fixation mechanism, the method further comprising affixing a second fixation mechanism to the vertebra by penetrating the vertebra.

71. *(Originally presented)* The method of claim 70 wherein the step of affixing a second fixation mechanism comprises attaching the second fixation mechanism to the first fixation mechanism.

72. *(Originally presented)* The method of claim 71 wherein the step of attaching the second fixation mechanism comprises inserting a fastener into the vertebra.

73. *(Originally presented)* The method of claim 72 wherein the step of inserting a fastener comprises inserting a fastener into a lamina portion of the vertebra.

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74. *(Amended)* The method of claim 72 wherein the inserting step comprises inserting the fastener through the fixation element across a midline of the vertebra.

75. *(Originally presented)* The method of claim 72 further comprising attaching the artificial facet joint bearing element to the fastener.

76. *(Originally presented)* The method of claim 57 wherein the disposing step comprises moving the artificial facet joint bearing element in a cephalad or caudad direction with respect to the vertebra.

77. *(Cancelled)*

78. *(NEW)* A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint;

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the vertebra without penetrating any bone portion of the vertebra; and

an attachment mechanism attaching the artificial facet joint bearing element to the fixation mechanism, wherein the attachment mechanism disposes the artificial facet joint bearing element caudad from the fixation mechanism.

79. *(NEW)* The prosthesis of claim 78 wherein the fixation mechanism is further adapted and configured to attach to a lamina portion of the vertebra.

80. *(NEW)* The prosthesis of claim 79 wherein the fixation mechanism is further adapted and configured to attach to the lamina portion of the vertebra substantially at a spinous process location.

81. *(NEW)* The prosthesis of claim 80 wherein the fixation mechanism is further adapted and configured to be in contact with the lamina portion of the vertebra on at least two opposing sides of the lamina portion of the vertebra.

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82. *(NEW)* The prosthesis of claim 81 wherein the fixation mechanism is further adapted and configured to be in contact with the lamina portion of the vertebra on four surfaces of the lamina portion of the vertebra.

83. *(NEW)* The prosthesis of claim 78 wherein the fixation mechanism is further adapted and configured to attach the artificial facet joint element to the vertebra without blocking access to a pedicle portion of the vertebra.

84. *(NEW)* The prosthesis of claim 78 wherein the fixation mechanism is further adapted and configured to be in contact with an attachment portion of the vertebra on at least two opposing sides of the attachment portion of the vertebra.

85. *(NEW)* The prosthesis of claim 84 wherein the fixation mechanism is further adapted and configured to be in contact with the attachment portion of the vertebra on four surfaces of the attachment portion of the vertebra.

86. *(NEW)* The prosthesis of claim 78 wherein the fixation mechanism comprises first and second vertebral contact components comprising first and second vertebral contact surfaces, respectively, at least one of the first and second vertebral contact components being moveable with respect to the other vertebral contact component.

87. *(NEW)* The prosthesis of claim 78 wherein the fixation mechanism is a first fixation mechanism and wherein the attachment mechanism is adapted and configured to penetrate a bone portion of the vertebra to form a second fixation mechanism attaching the artificial bearing element to the vertebra.

88. *(NEW)* The prosthesis of claim 78 wherein the attachment mechanism is adapted and configured such that the artificial facet joint bearing element is moveable in a cephalad or caudad direction with respect to the fixation mechanism.

89. *(NEW)* The prosthesis of claim 88 wherein the attachment element comprises a location element moveable in a cephalad or caudad direction with respect to the fixation mechanism.

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90. *(NEW)* The prosthesis of claim 89 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint.

91. *(NEW)* The prosthesis of claim 90 wherein the right and left artificial facet joint bearing elements are attached to the attachment element.

92. *(NEW)* The prosthesis of claim 78 wherein the artificial facet joint bearing element is a right artificial facet joint bearing element and the natural facet joint is a right natural facet joint, the prosthesis further comprising a left artificial facet joint bearing element adapted and configured to replace a cephalad portion of a left natural facet joint.

93. *(NEW)* The prosthesis of claim 92 further comprising right and left attachment elements attaching the right and left artificial facet joint bearing elements to the fixation mechanism.

94. *(NEW)* The prosthesis of claim 78 wherein the fixation mechanism comprises a clamp.

95. *(NEW)* The prosthesis of claim 78 wherein the fixation mechanism is a first fixation mechanism, the prosthesis comprising a second fixation mechanism adapted and configured to penetrate a bone portion of the vertebra to attach the artificial bearing element to the vertebra.

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96. *(NEW)* A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint;

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the vertebra without penetrating any bone portion of the vertebra, and

an attachment mechanism attaching the artificial facet joint bearing element to the fixation mechanism, wherein the attachment mechanism is adapted and configured such that the artificial facet joint bearing element is moveable in a cephalad or caudad direction with respect to the fixation mechanism.

97. *(NEW)* The prosthesis of claim 96 wherein the fixation mechanism is further adapted and configured to attach to a lamina portion of the vertebra.

98. *(NEW)* The prosthesis of claim 96 wherein the fixation mechanism is further adapted and configured to attach to the spinous process of the vertebra.

99. *(NEW)* The prosthesis of claim 97 wherein the fixation mechanism is further adapted and configured to be in contact with the lamina portion of the vertebra on at least two opposing sides of the lamina portion of the vertebra.

100. *(NEW)* The prosthesis of claim 96 wherein the fixation mechanism comprises first and second vertebral contact components comprising first and second vertebral contact surfaces, respectively, at least one of the first and second vertebral contact components being moveable with respect to the other vertebral contact component.

101. *(NEW)* The prosthesis of claim 96 wherein the attachment mechanism is adapted and configured to traverse a midline of the vertebra.

102. *(NEW)* The prosthesis of claim 96 wherein the fixation mechanism comprises a clamp.

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103. *(NEW)* The prosthesis of claim 96 wherein the fixation mechanism is a first fixation mechanism, the prosthesis comprising a second fixation mechanism adapted and configured to penetrate a bone portion of the vertebra to attach the artificial bearing element to the vertebra.

104. *(NEW)* A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint; and

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the vertebra without penetrating any bone portion of the vertebra, wherein the fixation mechanism comprises a clamp.

105. *(NEW)* The prosthesis of claim 104 wherein the fixation mechanism is further adapted and configured to attach to a lamina portion of the vertebra.

106. *(NEW)* The prosthesis of claim 104 wherein the fixation mechanism is further adapted and configured to attach to the spinous process of the vertebra.

107. *(NEW)* The prosthesis of claim 105 wherein the fixation mechanism is further adapted and configured to be in contact with the lamina portion of the vertebra on at least two opposing sides of the lamina portion of the vertebra.

108. *(NEW)* The prosthesis of claim 104 further comprising an attachment mechanism attaching the artificial facet joint bearing to the fixation mechanism.

109. *(NEW)* The prosthesis of claim 108 wherein the attachment mechanism is adapted and configured to traverse a midline of the vertebra.

110. *(NEW)* The prosthesis of claim 104 wherein the fixation mechanism is a first fixation mechanism, the prosthesis comprising a second fixation mechanism adapted and configured to penetrate a bone portion of the vertebra to attach the artificial bearing element to the vertebra.

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111. *(NEW)* A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint;

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the vertebra without penetrating any bone portion of the vertebra, wherein the fixation element is a first fixation mechanism, the prosthesis comprising a second fixation mechanism adapted and configured to penetrate a bone portion of the vertebra to attach the artificial bearing element to the vertebra.

112. *(NEW)* The prosthesis of claim 111 wherein the fixation mechanism is further adapted and configured to attach to a lamina portion of the vertebra.

113. *(NEW)* The prosthesis of claim 111 wherein the fixation mechanism is further adapted and configured to attach to the vertebra substantially at or near a spinous process location.

114. *(NEW)* The prosthesis of claim 111 wherein the fixation mechanism comprises first and second vertebra contact surfaces, the distance between the first and second vertebra contact surfaces being adjustable.

115. *(NEW)* The prosthesis of claim 111 wherein the fixation mechanism comprises first and second vertebral contact components comprising first and second vertebral contact surfaces, respectively, at least one of the first and second vertebral contact components being moveable with respect to the other vertebral contact component.

116. *(NEW)* The prosthesis of claim 111 further comprising an attachment mechanism attaching the artificial facet joint bearing element to the fixation mechanism.

117. *(NEW)* The prosthesis of claim 116 wherein the attachment mechanism is adapted and configured to traverse a midline of the vertebra.

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118. (NEW) A prosthesis to replace a cephalad portion of a natural facet joint on a vertebra, the prosthesis comprising:

an artificial facet joint bearing element adapted and configured to replace the cephalad portion of the natural facet joint; and

a fixation mechanism adapted and configured to attach the artificial facet joint bearing element to the vertebra, the fixation mechanism comprising a non-invasive support member adapted and configured to attach to a lamina portion of the vertebra, and

an attachment mechanism attaching the artificial facet joint bearing element to the fixation mechanism, wherein the attachment mechanism traverses a midline of the vertebra.

119. (NEW) The prosthesis of claim 118 wherein the support member is further adapted and configured to attach to the lamina portion of the vertebra substantially at a spinous process location.

120. (NEW) The prosthesis of claim 118 wherein the support member comprises first and second vertebral contact components comprising first and second vertebral contact surfaces, respectively, at least one of the first and second vertebral contact components being moveable with respect to the other vertebral contact component.

121. (NEW) A method for implanting a cephalad facet joint prosthesis on a vertebra, the method comprising the steps of:

affixing a fixation mechanism to the vertebra without penetrating any bone portion of the vertebra, wherein the affixing step comprises placing a fixation mechanism in contact with an attachment portion of the vertebra on at least two opposing sides of the attachment portion of the vertebra; and

disposing an artificial facet joint bearing element extending from the fixation mechanism in a predetermined position with respect to the vertebra, wherein the fixation mechanism comprises first and second vertebral contact components, the affixing step comprising moving one of the first and second vertebral components with respect to the other.

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122. *(NEW)* The method of claim 121 wherein the affixing step comprises affixing the fixation mechanism to a lamina portion of the vertebra.

123. *(NEW)* The method of claim 121 wherein the affixing step comprises affixing the fixation mechanism at or near a spinous process portion of the vertebra.

124. *(NEW)* The method of claim 122 further comprising the step of removing the spinous process prior to the affixing step.

125. *(NEW)* The method of claim 121 wherein the affixing step further comprises preventing relative movement between the first and second vertebral contact components after the moving step.

126. *(NEW)* The method of claim 121 further comprising fastening the artificial facet joint bearing element to the fixation mechanism.

127. *(NEW)* The method of claim 126 wherein the fastening step comprises inserting a fastener through the fixation element.

128. *(NEW)* The method of claim 126 wherein the fastening step comprises inserting a fastener across a midline of the vertebra.

129. *(NEW)* The method of claim 127 wherein the fastener comprises a screw.

130. *(NEW)* The method of claim 121 wherein the fixation mechanism is a first fixation mechanism, the method further comprising affixing a second fixation mechanism to the vertebra by penetrating the vertebra.

131. *(NEW)* The method of claim 130 wherein the step of affixing a second fixation mechanism comprises attaching the second fixation mechanism to the first fixation mechanism.

132. *(NEW)* The method of claim 131 wherein the step of attaching the second fixation mechanism comprises inserting a fastener into the vertebra.

133. *(NEW)* The method of claim 132 wherein the step of inserting a fastener comprises inserting a fastener into a lamina portion of the vertebra.

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134. *(NEW)* The method of claim 132 wherein the inserting step comprises inserting the fastener across a midline of the vertebra.

135. *(NEW)* The method of claim 121 wherein the disposing step comprises moving the artificial facet joint bearing element in a cephalad or caudad direction with respect to the vertebra.

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